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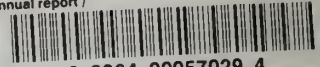
**Montana
Science &
Technology
Alliance**

**1986
Annual Report**

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1986 Annual Report

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December 1, 1986

The Honorable Ted Schwinden
Governor
State of Montana
Helena, Montana 59620

Dear Governor Schwinden:

It gives me great pleasure to transmit to you the first annual report of the Montana Science and Technology Alliance. I think you will agree with me, after perusing this report, that the Alliance has made significant strides toward accomplishing its purpose of forging a new partnership involving the private sector, university system, and state government to stimulate the commercial development of innovative technology projects and companies in our state.

In just 16 months of existence, your Science and Technology Development Board has committed \$1.6 million in funds to research and development and seed capital projects in Montana. If these projects all mature as planned, they have the collective potential for creating in excess of 1,200 new jobs in our state in the next five to seven years. In addition, they will very likely foster the creation of as many other new companies, both through example and by spinning off even more new products and services.

The enclosed report describes the procedures through which the Alliance conducts its business. More importantly, it provides information on each of the 18

projects which have received investment funding to date. Finally, the report sets forth a series of general recommendations for the future encouragement of research and development, innovation, and entrepreneurial business activity in Montana.

It has been a pleasure for me to serve as chairman of this important program, and I am sure that my fellow board members will agree with my belief that the Science and Technology Alliance holds significant potential for continuing to stimulate constructive and long-term economic development in our state.

Thank you once again for your support.

Sincerely,

R. Stephen Browning
Chairman

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Introduction

The Montana Science and Technology Alliance is a partnership of business, government and universities in Montana. Established by the 1985 legislature, the purpose of the Alliance is to strengthen the state's economy through the development and application of innovative science and technology, both in the laboratory and the marketplace. This is to be accomplished through the provision of financial support for applied research and development, technology transfer, and seed capital projects throughout the state.

These "technology investments" are made by a 15-member board of directors, appointed by the Governor and supported by staff provided by the Department of Commerce. Each investment is required to earn a return on investment that is commensurate with the original investment size and the degree of risk involved in the project.

During the 1987 biennium, the Alliance's capital base consisted of \$2 million of state funds, appropriated by the legislature from the Alternative Energy account of the coal severance tax fund. The board has invested these funds in those projects it believes to have outstanding technological and commercial potential for the economic future of Montana.

In short, the Science and Technology Alliance represents a commitment to a future for Montana that is heavily dependent on innovative technology for economic progress. It is designed to support a program of research, innovation and entrepreneurial activity which will solidify and expand the business and industrial base of the state.

Investment Programs

The Montana Science and Technology Alliance consists of four complementary investment programs, each offering financial assistance:

Research capability development

-- investments are used to help create new and strengthen existing in-state research and development capabilities within the university units, with particular emphasis on those projects which will be of greatest utility to private sector companies and organizations.

Applied technology research

-- support is provided to research projects which have significant potential for being successfully commercialized and in the process for solving problems affecting Montanans and creating new or retaining existing jobs.

Technical assistance and technology transfer -- investments in this category are utilized to stimulate the transfer and, where appropriate, the adaptation of new technologies from the laboratory to the marketplace in order to improve economic productivity and profitability. In addition, business development assistance for new entrepreneurial companies can also be provided.

Seed capital investment -- financing is provided for seed and startup stage companies which are proposing to commercialize products and/or services based on innovative technologies.

All programs, except technical assistance and technology transfer, require at least dollar-for-dollar matching participation utilizing non-state appropriated funds.

Investment Criteria

Entrepreneurs, businesspeople, researchers, industrialists and educators are all eligible to apply for MSTTA investment support. Priority has so far been given to those projects which addressed targeted technology areas and which incorporated both innovative technology and a clear path to commercialization. The target technologies are:

- minerals
- agriculture
- forestry
- energy
- materials science
- information services
- biotechnology
- microelectronics and computer sciences

While the Alliance welcomes all proposals, the areas of greatest interest to the board are projects that:

- are based on innovative technology;
- contain strong and clear potential for stimulating new job development or job retention;
- involve university participation; and
- add value to basic, existing business and industry in the state.

Investment Process

Each proposal received by the Alliance has been subjected to a rigorous technical and financial review process. The former was provided by a nationwide peer review network established and managed by the MONTS program, a university system research effort based at Montana State University. The financial reviews have been conducted by members of the MSTA financial advisory panel, a group of 31 business and investment experts throughout the state appointed by the Governor at the recommendation of the MSTA chairman.

Once reviewed, projects were discussed by the board of directors both in committee meetings and in full board session. Before final action was taken, additional due diligence was conducted by Alliance staff to answer any specific questions raised by technical and financial reviewers and board members.

After board approval, investment agreements were negotiated with each recipient. These agreements set forth the terms and conditions and return on investment requirements proposed by the board in its investment offer.

The MSTA investment review process is designed to provide an equitable and thorough evaluation of funding requests within a reasonable time frame. The rigor imposed by the process tests the technical feasibility and commercial viability of each proposal and, it is hoped, helps build a foundation for a high probability of success for the funded projects.

Return on Investment

The Alliance is required by statute to achieve a return on investment from each investment commensurate with its original funding level plus the degree of risk involved in the project. Due to the typically high risk and early stage nature of the projects considered, conventional financing from other sources is not usually available to the applicant. Accordingly, the Alliance expects to receive a rate of return of roughly twice the current prime interest rate, plus additional points for risk. During the past year, then, the program has usually received a discounted rate of return of between 15 and 22 percent, compounded annually, on its portfolio projects.

The return is structured so that the Alliance receives its payback as a percentage of gross sales once the project is commercialized. Payments are sometimes triggered when the company's gross sales reach a predetermined level, a process which can allow the initial sales revenue to be used to support additional growth until the company has achieved a stable footing.

This return on investment policy differentiates the technology investment from a loan or grant in two ways. First, there is no structured repayment schedule which commences at a set point after the Alliance's disbursements are made; instead, all paybacks are triggered by actual sales revenues. Second, the investment is not collateralized; if the company fails to realize mutually agreed upon sales objectives, it has no obligation to repay the Alliance.

Program Results

In its first 16 months of operation, the Science and Technology Alliance has experienced significant interest in its programs. Over 170 funding inquiries were answered. These resulted in 64 executive summaries being submitted in response to the first step in the Alliance's application process. These in turn produced 28 full proposals, 18 of which have been approved by the board for investment.

Of the 64 executive summaries received, 31 involved university participation. A total of \$7.5 million in Alliance funds was requested, with an additional \$17.8 million proposed as matching funding. Twenty-two summaries dealt with research and development projects, 31 with seed capital requests, and 11 with technology transfer efforts. Summaries were received, moreover, in each of the eight target technology areas, although energy, agriculture and microelectronics and computer sciences represented over half of the summaries received. Finally, project summaries were received from Bozeman, Missoula, Helena, Butte, Billings, Great Falls, and several other smaller communities throughout the state. In addition, six summaries were received from out-of-state applicants expressing interest in relocating to Montana.

Of the 18 projects invested in by the Alliance board, 10 involve university participation. Total funds committed by the Alliance to date amount to \$1.64 million (out of \$1.66 million available for actual investment). Eight of the funded projects are in the seed capital category, four in applied research, two in research capability development, and four in technology transfer. Fully three-fourths of the funds committed to date, however, were invested in seed capital projects.

The technology areas which received investments were forestry (three projects), energy (two), agriculture (three), biotechnology (three), and microelectronics and computer sciences (four). In addition, one investment was made in information services and two in other types of projects.

In terms of the economic potential of the investments made to date, a total of between 1,100 and 1,250 new jobs could be created in the state within the next five years if all the seed projects are successfully commercialized in accordance with business plan projections.

MSTA Technology Investments

Agriculture

GeoResearch, Inc.
Billings
Remote electronic animal data system

Montana State University
Bozeman
Digitized computer analysis of farming soils

Alternative Energy Resources
Organization
Helena
Agricultural technology transfer conference

Biotechnology

ChromatoChem, Inc.
Missoula
High performance affinity chromatography

Alternative Diagnostix, Inc.
Missoula
Diagnostic test kits for in-home use

MSI Detoxification, Inc.
Bozeman
Microbial detoxification of chemical wastes

Energy

Western Energy Company
Butte
Coal beneficiation process engineering

Montana State University
Bozeman
Piezoelectric wind power generator

Forestry

Montana International Trade
Commission
Helena
Furniture manufacturing and marketing study

University of Montana
Missoula
Domestic cultivation of huckleberries

Wood Sciences Laboratory
Corvallis
Lodgepole pine flanges and flakeboard webs

Information Services

Development Corporation of
Montana
Helena
Montana venture capital network

Microelectronics and Computer Sciences

Writing Software International
Missoula
Personal publishing computer software

Montana State University
Bozeman
Computer graphics and image analysis lab

Frontier Scientific Corporation
Bozeman
Computerized automation control systems

Impulse Computer Systems, Inc.
Billings
Beverage inventory control computer systems

Other

Ercon Systems, Inc.
Great Falls
Erosion protection matting

Bridger Bowl/Montana State
University
Bozeman
Winter weather modification

Individual Project Descriptions

SEED CAPITAL

ChromatoChem, Inc.

ChromatoChem, Inc. was founded in 1985 by Dr. Richard Hammen, a Missoula native, to manufacture and sell high performance affinity chromatography products for the separation, purification and analysis of high value-added chemicals and biochemicals. Affinity chromatography is a process by which a substance of interest is separated from other material by means of a highly specific interaction (affinity) between the substance and a solid surface. ChromatoChem has developed a new generation of affinity chromatography products that differ from previous technology in the field because of the use of silica beads for the solid support and the nature of the surface chemistry involved.

In July of this year, Dr. Hammen relocated the company from California to Missoula. Progress continues to be made on product research and development as well as the formalizing of marketing relationships for the company's products. ChromatoChem has hired three full time employees and has established product development and research contracts with the University of Montana.

The Alliance invested \$200,000 in ChromatoChem in February of 1986, which was matched with \$250,000 of private funding. ChromatoChem expects to provide up to 200 jobs in the Missoula area within five years. It is also expected to produce a 20 percent return on investment and generate an additional one-quarter of one percent sales override for a ten year period to the Alliance.



Dr. Richard Hammen, President of ChromatoChem

Alternative Diagnostix, Inc.

Alternative Diagnostix, Inc. was founded in 1983 by Dr. Charles McLaughlin, a Drummond native, to develop and manufacture diagnostic tests for the detection of infectious diseases in humans and animals. These test devices will initially be used in doctors' offices and small medical laboratories, and eventually will be made available for over-the-counter sale for in-home use.

The first tests produced by the company were for the diagnosis of chlamydia, the most common sexually transmitted disease in humans. This and related tests are state-of-the-art means for detecting the presence of microbial organisms. To continue product development, ADI has research contracts with the University of Montana and Montana State University.

The Alliance made an investment commitment of \$250,000 in the company in April of 1986. This will be matched by \$500,000 from other investors. If successful, ADI expects to achieve \$47 million in sales and employ between 200 and 250 people in the Missoula area by 1991. In return for the board's investment, ADI is expected to produce a 20 percent annual return on investment and pay a sales override of one-quarter of one percent for approximately 15 years to the Alliance.

GeoResearch, Inc.

GeoResearch, Inc. is a Billings firm headed by Dr. Douglas Richardson. The board's investment will be used to develop and sell prototype units of its Remote Electronic Animal Data Systems (READS).

The first units of the system were installed this past summer at the Fort Keogh Range and Livestock Station near Miles City. By providing the sole water source for livestock in a confined area, the units can enable the remote collection of data on cattle (such as weight, water consumption, and related weather conditions) when they enter the unit. The data is then transmitted, analyzed and stored on a centralized computer.

GRI matched the board's \$180,000 investment with funds from a U.S. Department of Agriculture grant and private investors. If successful, the company expects to employ an additional 51 people by the end of its fifth year of operation. GRI is expected to produce for the Alliance a 20 percent return on investment and pay a sales override of one-half of one percent per year for 15 years.

Impulse Computer Systems, Inc.

Impulse Computer Systems, Inc. is a Billings firm founded in 1983 to develop and sell computerized inventory control systems for beverage stock in the hospitality industry. The company's product, the ACCARDIS System, consists of a microprocessor, UPC scanner wand, a scale and a food management software package. When in use this system will allow for cost-effective beverage inventory control.

The Alliance committed to an investment of \$50,000, to be matched with an equal amount of private funding, at its October board meeting. The funds will be used to

finish the development of a new software package for the ACCARDIS system. ICS is in the process of finalizing its first major sales contract to supply a prominent international hotel chain with its ACCARDIS system.

The company's management team is headed by Craig Anderson, a Montana native raised in Havre, who has extensive experience in the beverage industry. Other members of the team lend additional expertise in the beverage industry as well as in computer sciences.

If successful the company expects to create 15 new jobs in the Billings area within one year. The return on investment to the Alliance is currently under negotiation.



Cattle stall for GeoResearch's Remote Electronic Animal Data System

Frontier Scientific Corporation

Frontier Scientific Corporation, a Bozeman company, was founded in 1985 to address the rapidly expanding automation market. The company will design, market and service an innovative new family of electronic automation controllers and related products for use in small to medium sized manufacturing businesses.

The new product system is capable of providing motion, process, and programmable control functions in a single unit by utilizing a communications network to allow the various control disciplines to interact for greater control flexibility. Additionally, the system utilizes a user-friendly programming language, easily interfaces with other factory systems and is expandable.

At its October meeting, the Alliance voted to reserve a commitment of up to \$100,000 for the company, to be matched with at least \$200,000 of private funds. The investment will be used to complete the product development of its computerized automation control system. The board will make a final investment decision at its January 1987 meeting. If successful, the company expects to create 150 new jobs in Bozeman by 1991.

Writing Software International

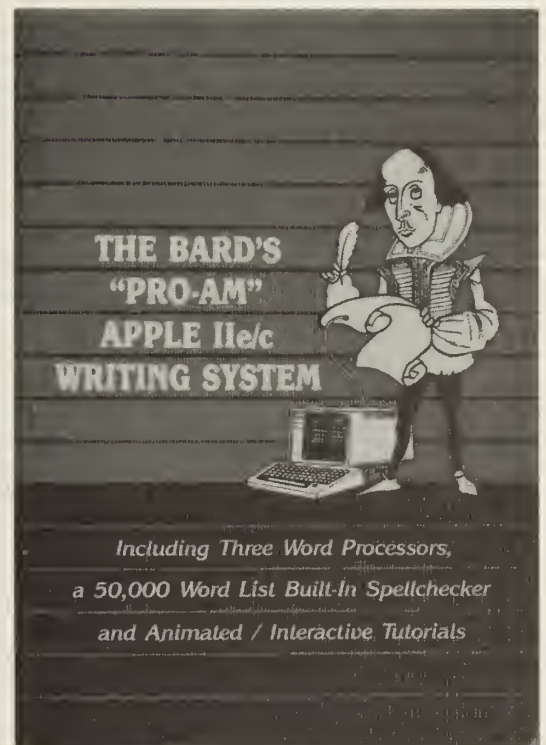
Writing Software International was formed in late 1985 in Missoula and specializes in writing productivity and personal desktop publishing products for the home, small business and school markets. Available since January of 1986, its current product, "The Bard's 'Pro-Am' Writing System," is a coauthoring software product that has been developed for the Apple II series computer. This product consists of three word processors (to accommodate all levels of user experience -- hence the 'pro-am' in the name), a built-in spell checker and an animated graphic tutorial.

With the Alliance's investment, the company is in the process of translating "The Bard" to other computer languages that will run on IBM and IBM-compatible personal computers, and complete the

development of a new release of a more powerful version of "The Bard" for use on the new Apple II series computer.

The cofounders, Spencer Manlove, president, and Richard Cummins, vice president, have a wealth of experience in the computer field gained through employment with several national computer firms handling development, marketing and sales, as well as teaching in the computer science department and the developmental reading institute at the University of Montana.

The Alliance invested \$50,000 in July of 1986, while WSI has received investments of over \$480,000 to date. The company expects to create 40 new jobs by 1991 in the Missoula area. WSI is expected to produce a 20 percent annual rate of return and pay an additional sales override of one-quarter of one percent for seven years to the Alliance.



WSI's software packaging for "The BARD"

Western Energy Company

In April of 1986, the board voted to invest \$350,000 in a project with the Western Energy Company in Butte to conduct a process engineering and design study of a coal beneficiation process. WECO, a subsidiary of the Montana Power Company, is working on the project in cooperation with MultiTech, a Butte engineering consulting firm, and the Montana College of Mineral Science and Technology.

The project consists of a process engineering study for removal of moisture, ash and sulfur from coal mined in Montana. If the process proves technically feasible, WECO plans to begin construction of a demonstration plant in the Miles City area in 1987.

A unique aspect of this project is that it involves funds generated by the coal severance tax. If successful, the process could ultimately result in a significant increase in revenues to the coal tax fund. The eventual sale of the processed coal by WECO will not only generate a return on investment to the Alliance, but will also generate increased coal severance tax revenues.

If the demonstration plant is successful, the company expects to create by 1990 between 200 and 250 new jobs in the Miles City area along with new support jobs in Butte, and eventually build three full scale coal processing plants by 1999.

The Alliance's investment was matched with an equal amount of WECO funds. In return for the funding, WECO is expected to produce for the Alliance a 12 percent return on investment and pay a sales override of 2 cents per ton for 10 years on the processed coal.

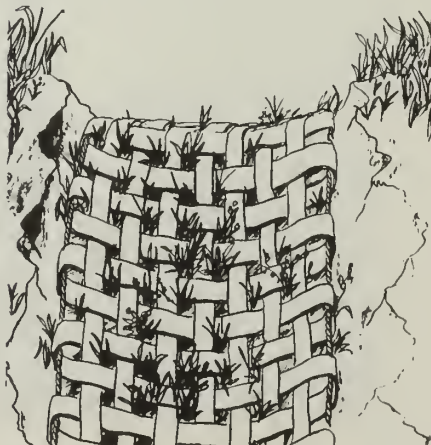
Ercon Systems, Inc.

Ercon Systems, Inc. is located in Great Falls and was founded by Donald Chevalier and Donald Johnston. The Alliance's investment of \$20,000 is being used to develop the prototype machines necessary to produce an erosion control matting product, made from used tires, and site-test the product in the control of stream bank and construction-related erosion.

The company has completed design and construction of prototype machines and is in the process of finalizing agreements with various organizations, including the U.S. Army Corps of Engineers and various state and local public works agencies, to perform on-site tests of the matting material during 1987.

The Board's initial investment of \$20,000 was matched with \$20,000 in private capital. If the test site results prove positive, the Board may invest additional funds.

If successful, the company expects to create up to 60 new jobs in Great Falls by 1991. Upon commercialization, the Alliance will receive a 17 percent annual return on investment plus a sales override of one-quarter of one percent for five years and one-half of one percent for an additional 10 years.



Artist's drawing of Ercon System's erosion protection matting product

APPLIED RESEARCH

Bridger Bowl/Montana State University

In October the board voted to invest \$10,160 in an applied research project proposed by Bridger Bowl Ski Area and Montana State University's College of Engineering. The funds will be used to apply winter weather modification research techniques, mainly cloud seeding, developed at MSU to the Bridger Bowl ski area to attempt to enhance early season snow conditions.

If the project is successful, it will enable Bridger Bowl to open earlier than normal, before the December holiday season, and thereby generate higher ticket sales at the resort as well as increased revenues for Bozeman area businesses. In addition, there are possible future applications at other ski areas in the state.

The Alliance's funds will be matched with over \$30,000 from Bridger Bowl and other private investors. The return on investment to the Alliance is under negotiation.

Digitized Soil Mapping and Computerized Applications by Montana State University.

In July of 1986, the Board invested \$33,428, matched with an equal amount of private funds, in an applied research project of Dr. Gerald Nielsen, of MSU's Plant and Soil Science Department. The project involves the development of a system for more efficient application of fertilizers and herbicides to farmland through the use of video mapping techniques.

Soil maps generated by the project would then be used either in new computerized guidance systems on farm implements or to guide the manual operation of existing farm equipment to assure the most economical application of fertilizers and herbicides where they are needed instead of uniformly applying them to farming fields without regard to actual need. This type of management based on soils instead of fields would reduce the farmers' costs, increase farm profits and improve the quality of soil and water resources.

If eventually commercialized, the technology would provide increased jobs and higher productivity in the agricultural industry. In addition, the Alliance has reserved the right to negotiate a future return on investment if commercialization by the project participants occurs.

Feasibility Study of Domestic Cultivation of Huckleberries by the University of Montana

In July of 1986, the Board invested \$36,000, matched with over \$44,000 of private funding, in the university's project to conduct a three-year applied research study on the feasibility of domestic cultivation of huckleberries at low elevations and semi-cultivation at higher elevations. The study will be conducted by Dr. Nellie Stark from the university's College of Forestry.

The research will include the outplantings of huckleberry plants to test the possibilities of a cultivated huckleberry crop in this state. In addition, growth chamber studies will be conducted with various fertilizers to provide better understanding of the nutritional needs of the plants essential for successful field plantings. The ultimate objective of the study will be to determine in three years' time where the wild huckleberry will grow more consistently and how production can be enhanced for commercial purposes.

Previous research has indicated that Montana has the best soils for producing high quality, flavorful berries. If cultivation proves feasible, a stable source of high quality in-state huckleberries would become available to the Montana huckleberry industry, thereby providing increased and more stable job opportunities.

If the research results are eventually commercialized, the Alliance reserves the right to negotiate a return on investment position.

New Technology for Wind Power Generation by Montana State University

In July of 1986, the Board committed \$30,000 to the Montana State University to continue applied research into a wind power generating system using piezoelectric polymers--new materials thought to be more efficient for that purpose. Dr. V. Hugo Schmidt of MSU's Department of Physics, will serve as the principal investigator.

Before any of the board's funds are disbursed, the investment must be matched with an equal amount of funds from a private company active in the alternative energy field. If the technology proves successful, a new alternative energy source would be available, and, it is hoped, commercialized by the private partner.

The return on investment terms are under negotiation.

RESEARCH CAPABILITY DEVELOPMENT

Applied Research Laboratory for Computer Graphics and Image Analysis at Montana State University

The Department of Computer Science at MSU, headed by Dr. J. Denbigh Starkey, is currently creating a modern applied research laboratory for computer graphics and image analysis. The facility will integrate over \$100,000 of new equipment donated by Digital Equipment Corporation and Tektronix computer companies; the additional necessary equipment will be purchased with the Alliance investment of \$81,713.

The research capabilities of high technology departments such as computer sciences at MSU will form an important contributing component to the success of the new Advanced Technology Park in Bozeman. This new computer graphics capability will provide an important anchor for the facility. In fact, the only other similar computer laboratory facility of this type in the Rocky Mountain region is in Utah.

Once the facility is on line, the laboratory will become a recognized resource that can be accessed by professionals at the university and the Bozeman technology park as well as by other individuals and businesses throughout the state, thereby enhancing the university's reputation and increasing the park's chances for success.

As a return on investment, the Alliance will receive a share of a fee which will be assessed on private sector users, starting at 15 percent in the first year and declining to 5 percent in the tenth year of operations.

MSI Detoxification, Incorporated

In October of 1986, the Board invested \$150,000 in MSI Detoxification, Inc., a subsidiary of Maitreya Systems, Inc., which recently relocated its research and development division to Bozeman from Virginia. The Chemistry Department of Montana State University will also be a lead coparticipant in the project.

The investment is being made under the Alliance's research capability development funding program. MDI will conduct a pilot research project to demonstrate new technologies utilizing naturally occurring individual microorganisms to detoxify hazardous wastes.

The funds will be matched with \$250,000 from MDI to purchase state-of-the-art mass spectrometry equipment to increase the speed and capabilities of the mass spectrometer and data system already in place at MSU. All of the equipment purchased will be located in the Department of Chemistry's mass spectrometry laboratory. After completion of MDI's initial research work, the equipment will be deeded to the university.

The company anticipates the creation of 40 new jobs in the Bozeman area within three years for further R & D activity. The return on investment to the Alliance is under negotiation.

TECHNOLOGY TRANSFER

Development Corporation of Montana

The Development Corporation of Montana's venture capital network project is funded under the Alliance's technical assistance and technology transfer funding program.

The objective of the project is to create a network of in-state investors who would be interested in being exposed on a regular basis to investment opportunities involving young entrepreneurial companies in Montana.

The project design is twofold. The first phase involved developing and mailing a questionnaire to over 200 individuals targeted as potential members of the network to assess their level and areas of interest. Results indicated a sufficient degree of interest and plans are underway to implement the second phase, the actual establishment of the network and initiation of a series of regularly scheduled meetings for the members.

The object of the network meetings will be to facilitate the flow of information between entrepreneurs and investors, to provide greater investment opportunities for venture capital companies and individual investors, and to provide entrepreneurs better access to investment capital.

Such a network could also entail the establishment of a computerized data base consisting of in-state investors and entrepreneurs in order to provide a continual means of comparing investor interests and entrepreneurial needs. Networks similar to this have been in existence in other states since the 1970s.

In consideration for the \$7,100 investment by the Board, the Alliance will be an active participant in the network as a charter member.

Montana International Trade Commission

This project is designed to study the feasibility of adapting Scandinavian furniture design and manufacturing technology to Montana's wood products industry, particularly the use of lodgepole and white pine as the principal wood source. The Alliance has invested \$50,000 in the technology transfer project, with \$30,000 in matching funds to be provided by several private wood products companies in Montana.

If proven feasible, the project could be commercialized and the furniture and houseware items produced would be constructed of white wood in the Scandinavian style. It is envisioned that the products would be sold to both domestic and foreign markets, particularly in Pacific Rim countries.

If commercialized, the project will provide increased jobs in the forest products industry and utilize the widely available lodgepole pine. If commercialized by MITC, it is expected to produce a 17 percent per year return on investment and generate an additional one-half of one percent sales override for a 15 year period to the Alliance.

Wood Science Laboratory

The board voted to invest \$35,000 in a technology transfer project proposed by the Wood Science Laboratory headed by Dr. Peter Koch of Corvallis. The University of Montana and the U.S. Forest Service Intermountain Research Laboratory are coparticipants and are expected to provide matching funds of \$113,557.

The project will study the technical and economic feasibility and complete the development of fabricated joists constructed of minimally machined lodgepole pine flanges and flakeboard webs. Montana has an abundance of lodgepole pine that is currently commercially unprofitable for use in the traditional forest products industry. The proposed joists would be significantly stronger, stiffer and lighter than conventional joists, making them a viable option in the construction industry.

If commercialized, the project could eventually create 200 new jobs in the forest products industry in Montana, including 50 jobs to harvest the lodgepole pine and 150 at the manufacturing plant. The return on investment to the Alliance is under negotiation.

Alternative Energy Resources Organization

This project, proposed by the Alternative Energy Resources Organization (AERO), will use \$7,500 in Alliance funds to cosponsor with the Montana State University and other organizations a conference on agricultural marketing.

The two-day conference, entitled "Innovations and Options in Food and Forage Marketing," will be held at Montana State University and will be designed to stimulate the exchange of information between marketing representatives and farmers and ranchers about possible value-added products and technologies appropriate to Montana.

The purpose of the project will be to stimulate the transfer of new available technology to a wider spectrum of farmers and ranchers. It is anticipated that between 200 and 300 people will attend from Montana, other western states and Canada.

Future Program Directions

During the past decade, over 90 percent of the new jobs created in the United States have resulted from entrepreneurial activity which has produced new business start-ups and expansions. Entrepreneurial activity is usually viewed as the culmination of the entrepreneurial stream which begins with research, moves to innovation (or transfer), and results in entrepreneurial business activity.

In Montana, a strong entrepreneurial spirit appears to be building--a fact which is attested to by the high quality and large numbers of projects encountered by the Science and Technology Alliance in its first 16 months of existence. The number of inquiries and resulting project summaries received is all the more significant in view of the fact that very little public notice was given that the program was in place and ready to receive applications.

If this entrepreneurial spirit is to flourish, however, the Alliance believes that several steps must be taken to provide a truly supportive environment in our state.

Research and development

-- first of all, more support is necessary for all types of basic and applied research and research capability development. Without it, the ideas necessary for continued new business development will be seriously diminished.

Innovation -- two problems are particularly troublesome in this area: first, a greater effort must be made to facilitate the transfer of research results from the laboratory to the marketplace through more aggressive and better targeted technology transfer activity; and second, much more business development assistance is needed to aid seed and start-up stage companies take their products to the marketplace so that they can successfully develop and mature.

Seed capital -- it is overwhelmingly apparent that there is simply not enough risk or venture capital available in Montana to support companies with high growth potential in the early stages of their development. Without such capital these companies typically fail or are forced to move out of the state to find it. This situation also serves as an impediment to new companies that are interested in relocating to our state to take advantage of our research capabilities, quality of life, and other attributes.

The Alliance board of directors has recommended several courses of action which it feels will help significantly in the development of solutions to these problems.

Research and Development

- Continue to provide financial support in a highly selective way for **applied research and research capability development** projects within our universities. These efforts should help to promote increased practical research and development activity.
- Fund a **centers of excellence** program at each of the three research institutions in our university system. Each unit should develop a single center, focusing on those individual R & D areas where there has already been significant development. Such areas could include biotechnology (particularly as it relates to nutrition and medical processes), microelectronics, hazardous waste detoxification, and so on. The primary criteria for funding should be the center's potential for impacting the commercial development of products initially conceived of and researched at the center.

Innovation

- Create a **technology transfer clearinghouse** which would incorporate a centralized data base readily accessible to those individuals who are searching for information and resources in the state which could assist them in solving business-related problems, identify new markets, and simply keep in touch with new research and development efforts in other economic sectors of the state's economy.
- Develop a **business assistance capability** by providing financial support for a network of "incubator" facilities in the key cities of the state. These should be designed to provide support for new businesses in such activities as business plan development, finance and accounting, strategic planning, marketing, management, and employee recruitment and training, among others. They should be established with state and matching funds. It has been estimated that over 90 percent of the new businesses that fail each year in our country do so because of either a lack of sufficient capital or access to adequate business development and marketing expertise; this approach would go far toward overcoming both of these problems in Montana.

Seed and Risk Capital

- Provide continued support for the development of a **venture capital network**, currently being developed for the state by the Development Corporation of Montana under contract to the MSTA. This will provide a mechanism for bringing potential investors in contact with entrepreneurs in need of seed and start-up capital.
- Extend the **venture capital tax credit** contained in the Montana Capital Companies Act of 1983, preferably at a level of 50 percent with a ceiling of at least \$3 million. This should aid significantly in both the formation of more venture capital and in the creation of additional venture capital companies in the state.
- Encourage the state **Board of Investments** to set aside 3 to 5 percent of its total investment pool for placement with venture capital companies that would in turn manage the investments for the Board. A very realistic return on these funds if placed with solid and reputable venture firms would be in the 20 to 30 percent per year range, with a secondary impact being the creation of more available capital for state companies in need of venture financing.
- Create a larger **seed capital fund** to be managed by the Science and Technology Alliance for the support of technology-based companies. These funds would be used to continue to provide support to early stage companies attempting to grow and mature in Montana.

If the above recommendations were implemented, significant strides could be made in fostering technology-based economic development in Montana. With this kind of "pump priming" activity, moreover, the private sector would gradually be induced to take over the role of financing and supporting new and more diversified economy for Montana.

Appendices

Statistical Analysis of Project Summaries

(as of November 1, 1986)

Inquiries	173
Executive Summaries	64
Summaries with University Participation	31
Formal Proposals	28
Alliance Funds Requested in Summaries	\$ 7,531,936
Private Matching Funds	\$17,844,180
Total Project Costs from Summaries	\$25,376,116

Funding Requests by Program Category

Research and Development	22	\$2,110,564
Seed Capital	31	4,909,000
Technology Transfer	11	512,372

Funding Requests by Technology Area

Technology area	Number of Requests	Alliance Funds Requested	Total Cost
Forestry	4	\$ 102,502	\$ 142,804
Energy	13	2,103,012	4,992,024
Agriculture	10	612,150	1,551,610
Minerals	3	450,000	6,000,000
Materials Science	2	342,500	685,000
Biotechnology	5	692,625	1,972,250
Microelectronics & Computer Science	15	2,080,975	7,955,551
Information Services	8	700,672	1,181,877
Other	4	447,500	895,000

Geographic Analysis

Bozeman	19
Missoula	8
Helena	7
Butte	6
Out-of-State	6
Billings	5
Great Falls	3
Anaconda, Broadview, Corvallis, Havre, Kalispell, Lewistown, Libby, Scobey, Sidney, Whitefish	1 each

Statistical Analysis of Investments

(as of November 1, 1986)

Formal Proposals Received	28
Formal Proposals Funded	18
Funded Proposals with University Participation	10
Total MSTA Funds Committed	\$1,640,910

Funded Proposals by Program Category

	Projects	Jobs Created (within 5 years)	MSTA Funds
Seed Capital	8	865-1,015	\$1,200,000
Applied Research	4		109,597
Research Capability Development	2	40	231,713
Technology Transfer	4	200	99,600
Totals	18	1,105-1,255	\$1,640,910

Funded Proposals by Technology Area

Technology Area	Number of Projects	Alliance Funds Committed	Total Cost
Forestry	3	\$ 121,000	\$ 308,751
Energy	2	380,000	760,000
Agriculture	3	220,928	515,887
Minerals	0	0	0
Materials Science	0	0	0
Biotechnology	3	600,000	1,600,000
Microelectronics & Computer Science	4	281,713	1,093,426
Information Services	1	7,100	7,100
Other	2	30,169	80,638
Totals	18	\$1,640,910	\$4,365,802

Geographic Analysis

Bozeman	6
Missoula	4
Helena	3
Billings	2
Butte, Corvallis and Great Falls	1 each

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